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PEOPLE WHO REPORT RELIGIOUS EXPERIENCES MAY ALSO DISPLAY ENHANCED TEMPORAL-LOBE SIGNS

M. A. PERSINGER[1]

Laurentian University

Summary.—Religious and god-related experiences have been hypothesized to be a portion of the continuum of phenomena that are generated by endogenous, transient electrical stimulation within deep structures of the temporal lobe. According to this hypothesis, normal people, without psychiatric history, who report intense religious experiences should also demonstrate a wide range of temporal lobe-related private behaviors. To test this prediction, a self-report inventory that contained 140 temporal-lobe-relevant information, opinion-belief, and sampled MMPI statements was administered to two separate groups ($n = 108$; $n = 41$) of male and female first-year university students. In Study I, subjects who had reported religious experiences, particularly those who did not attend church regularly, scored significantly higher on a variety of statement clusters ($n = 7$ to 14 items) that contained temporal-lobe symptomology relative to groups who did not report religious experiences and did not attend church regularly. In Study II subjects, regardless of church attendance, who reported religious experiences scored significantly higher on the temporal-lobe clusters. People who reported religious experiences were more likely to have kept a dairy and to enjoy poetry reading or writing. However, religious experients and churchgoers did not score higher (in either experiment) on clusters that contained mundane psychological or proprioceptive statements, descriptions of odd sensations, or modified portions of the Lie scale from the MMPI.

Despite the powerful and pervasive effects of religious experiences and their correlative beliefs upon large segments of human behavior, the neuropsychological bases of these responses are rarely considered. Both historical and contemporary evidence indicates that even national leaders may be prone to rely upon these ambiguous displays for critical life-and-death decisions. There are several possible reasons for the conspicuous paucity of neuropsychological explanations for religious and God-related experiences. No doubt the issue is politically and personally volatile, even within academic contexts. Moreover, much like the conflicts over research on sex and death during previous decades, the topic evokes a type of Heisenberg problem for the behavioral scientist since he is also prone to these experiences and related behaviors.

Recently, one hypothesis (Persinger, 1983) suggests that religious and God experiences, particularly those characterized by feelings of absolute meaningfulness, "oneness with the universe" or a parent surrogate (such as God or

[1]Neuroscience Laboratory, Department of Psychology, Laurentian University, Sudbury, Ontario, Canada P3E 2C6. This research was supported by NSERC (Canada) Grant No. GR0055.

Allah), personal profundity and the reduction of existential anxiety, are generated by microseizures within the temporal lobe of the brain. These microseizures are *normal*, endogenous, primarily subcortical transients. They allow coherence among brain structures that are not typically closely correlated. Conditions that precipitate these temporal lobe transients include the chemical consequences of personal crisis, anxiety, hypoxia, hypoglycemia, and fatigue. They may be learned (or disinhibited) by meditational techniques (Persinger, 1984) and are hypothesized to have evolved as a species-specific buffer against death anxiety. Language factors may contribute to the precipitation (mantras) or be involved with the occurrence (e.g., speaking in tongues) of religious experiences. Interestingly, covert (thinking) verbal responses have been reported to produce specific, reproducible electrical signatures within the rostral hippocampus and amygdala of patients who did not display signs of psychosis or epilepsy (Heath & Mickle, 1960).

If the hypothesis is correct, characteristics of religious experiences should reflect the experiential correlates of deep temporal-lobe structures (Gloor, 1972). Intense meaningfulness and affect ("knowing") would involve amygdaloid structures. Hippocampal functions should complement these experiences but in addition alter memory function, especially for the period of the microseizure. Vestibular (lifting, floating), auditory (hearing one's name called), and proprioceptive (out-of-body and "presence" of spirit reports) experiences would be prevalent. Inclusion of a reward center and the consequent reduction of "existential anxiety" would be associated with sensations of "a release of burden" (Persinger, 1983).

Every person may be classified along a continuum of temporal-lobe stability that determines the intensity and frequency of religious experiences. They should be most conspicuous among extreme conditions, such as temporal-lobe epilepsy and temporal-lobe psychosis. Bear and Fedio (1977) noted that temporal-lobe patients were prone to religiosity as well as viscosity (perseveration), circumstantiality (interpreting mundane events with great personal significance), hypergraphia, and a sense of important personal destiny. They were also prone to exotic philosophical and mystical ideas, dominated by nascient themes. Slater and Beard (1963) reported a dominance of religious ideation or god-experience themes, often embedded within multiple conversions, among a population of temporal-lobe psychotics. These observations are consistent with the prediction of repeated microseizures within deep temporal-lobe structures.

Individuals without psychiatric history should display similar but less intense symptoms. The hypothesis indicates that symptoms would be qualitatively similar to clinical clusters, but they would not dominate the person's daily experience nor would they be associated with more global neuropsycho-

logical dysfunctions, such as thought disorders or frank hallucinations. Instead, lucid "visitations by spiritual beings" or other imaginary creatures could be manifested as simply "a presence"; hypergraphia might be displayed as persistent diary writing and the relaxation experiences associated with writing prose or poetry. Viscosity would be indicated as perseveration in social settings while mystical states might be indicated in milder signs such as "early morning feeling of intense meaningfulness" or "hearing one's name called" once or twice in the person's history.

The existence of a continuum of temporal-lobe signs that can be traced through the normal and psychiatric populations is subject to debate. Whereas some neuroscientists might expect a natural continuum of experiences correlated with progressive recruitment and activation of relevant temporal-lobe structures, others might claim the existence of a dichotomous distinction between normality and pathology. However, even the latter approach would predict some occurrence of temporal-lobe signs within behaviors that are not, at present, considered clinically relevant. In this light, the present study was designed as an exploratory endeavour to determine if any large first-order effects implicative of temporal-lobe signs could be discerned by a self-evaluation technique.

METHOD

Subjects

In Study I, 61 female and 47 male students who were attending an evening first-year psychology course served as subjects. The average age was 28 yr. and ranged between 19 and 59 yr. of age. Of the subjects, 66 were single, 38 were married, and 4 were separated or divorced. The group was comprised of the following religious persuasions: Roman Catholic: 50%, Protestant: 46%, and professed agnostic or atheist: 4%.

In Study II, 42 students attending an intersession first-year university psychology course served as subjects; there were 29 females and 13 males. Of these subjects, 25 were single, 13 were married, and 4 were separated or divorced. Whereas 19 reported they were Roman Catholics, 20 reported Protestant affiliation. There were two professed agnostics and one subject who reported no affiliation or belief. Subjects in both experiments were given participation marks that contributed to the final course grade.

Procedure

The Personal Philosophy Inventory (PPI) was administered to the subjects in Study I (March, 1983) and Study II (June, 1983). They were asked to complete the relevant demographic questions and then to display (on a separate form) either a T (true) or F (false) response to each of the 140 items.

The instructions and testing were completed by another professor[2] in Study I and a teaching assistant[2] in Study II; they were not familiar with the basic hypothesis. The author did not have any direct contact with any of the subjects in Study I and had been exposed to the second group for one lecture. Whereas the first group was given the inventory during a period of the class reserved for psychological testing, the second group had no history of testing within the class context. The procedures of confidentiality were explained to the class; both studies were approved by the departmental ethics committee.

The inventory was composed of belief/opinion, information and temporal-lobe relevant ($n = 43$) statements. It also contained samples from the MMPI (Minnesota Multiphasic Personality Inventory). The latter were dominated by neutral ("Once in a while I laugh at a dirty joke"), phobia ("I am afraid of earthquakes"), psychotic ("Evil spirits possess me sometimes"), and Lie-scale ("I do not always tell the truth") statements. Information statements emphasized religious behaviors ("I go to church at least once a month") and life events such as "I hit my head (or was hit in the head) and blacked out," or histories that could influence self-report (e.g., "I have learned to meditate"). Statements of extreme claims such as "I have been taken aboard a spaceship" were included as well to help discriminate silly responses. Only one subject in Study II reported true to this statement and those data were excluded from this study.

Four temporal-lobe clusters (number of items in parenthesis), Temp I ($n = 14$), Temp II ($n = 13$), Temp III ($n = 7$), and Temp IV ($n = 9$), were derived on the basis of the frequency and "strangeness" of experiences reported by patients during deep-structure stimulation (Baldwin, 1960; Stevens, 1969), tumor-induced changes (Bingley, 1958; Gloor, 1972), psychomotor (complex partial) epilepsy (Weil, 1956; Williams, 1956), and temporal-lobe psychosis (Slater & Beard, 1963). Each cluster contained references to olfactory, auditory, vestibular, and visual signs as well as feelings of "presence," depersonalization, and meaningfulness. Tendencies towards perseveration, memory alterations, and sleep disturbances were included in the larger clusters. The degree of strangeness increased from Temp I to Temp IV with the latter comprising statements usually reserved for psychotic populations.

Many of the statements that have been designated as temporal-lobe signs have also been noted within spontaneous paranormal (parapsychological) reports (Persinger, 1974b; Neppe, 1983). They are dominated by alleged displays of telepathy, clairvoyance, and precognition. Consequently, the clear paranormal references were removed and a second group of temporal-lobe clusters were derived: Temp A (12), Temp B (10), Temp C (7), and Temp D (6). Pilot studies indicated that the paranormal cluster was loaded by reports of a

[2]Thanks to Dr. P. M. Valliant and Mr. Eddie Mantle for administering the inventory.

"sense of presence." The paranormal cluster ($n = 9$) was further decomposed into a Presence cluster ($n = 4$), and a TCP (telepathy-clairvoyance-precognition) cluster ($n = 5$). In addition, references ($n = 3$) to writing or reading poetry and maintaining a diary were clustered as "languaging."

Sample questions were: Temp I ("Sometimes, in the early morning hours between midnight and 4:00 a.m., my experiences are very meaningful"), Temp II ("I have had a vision"; At least once a month I experience intense smells that do not have an obvious source"), Temp III: ("There have been times when I have stared at an object and it appeared to become larger and larger"; "I often feel as if things are not real"), and Temp IV ("When I have a tough decision to make a sign will be given and I will know what to do"; "I am a special agent of God"). The paranormal cluster, which was drawn from the temporal-lobe statements included "Sometimes I can read another person's thoughts" and "An inner voice has told me where to find something and it was actually there." "Presence" statements involved "At least once in my life, late at night, I have felt the persence of another Being," and "I have been visited by a Spiritual Being."

For comparison and control, several clusters of statements were derived on the basis of their commonality and non-specificity for temporal-lobe signs. The first cluster ($n = 10$) was called the mundane psychological experience and included statements such as "At times I feel like swearing" and "There are some days when I accidently hit my hand on something, smash my fingers or trip over my own two feet." The second cluster ($n = 10$) was called the mundane proprioceptive cluster and contained statements such as "When I get angry or upset, my legs feel weak" and "Sometimes when I am not feeling well, I am cross").

As a control for the propensity to say "yes" to any bizarre statement, a third cluster ($n = 5$) called "oddyes" was derived ("Every so often, I feel like gripping my thumb within the fingers of the same hand"). The partial lie scale (PLIE) was derived from nine items from the MMPI. All clusters contained at least one negative response mode such as "I have never had memory blanks." Test-retest correlation coefficients after ten days for 20 subjects (10 male, 10 female) for each cluster ranged from 0.85 to 0.98.

One postulate of the temporal-lobe hypothesis of God Beliefs[3] is that at least four types of groups must be discriminated to ascertain the specific neuropsychological mechanisms of God Beliefs and religious behaviors. They may be maintained by actual temporal-lobe experiences in some individuals or by peer-group reinforcement and social conditioning in others. The major design in the present study involved two-way analyses of variance according to answers to the statements "I have had a religious experience that I know was real" and

[3]M. A. Persinger, Neuropsychological bases of God beliefs. (Unpublished manuscript)

"I attend church at least once a month." Additional analyses were completed with a replicative question: "Most months I attend church at least once per week." (Since very similar results were found, the latter are not reported.)

Consequently, four groups were derived. Group I: individuals who did not attend church regularly and did not report a religious experience. Group II: those who reported a religious experience but did not attend church (regularly), Group III, those who did not report a religious experience but who attended church regularly and Group IV, those who both reported a religious experience and who attended church regularly. As a measure of the validity for the selection of these groups, church-relevant items called "church behavior" were clustered ($n = 6$). They included statements such as "I would rather go to a priest or minister than a psychologist for personal problems." A second cluster involved religious dogma ($n = 9$); they involved statements such as "Most people should be guided to ensure their spiritual development" and "I believe in the second coming of Christ."

To facilitate comparisons, all clusters were divided by the number of statements and multiplied by 100 such that the score of each person could range from 0 to 100. The closer the score approached 100, the more questions were answered with the equivalent of "yes" or "true." All analyses were completed by SPSS software on a DEC 2020 system computer. Checks for skewness and homogeneity of variance were completed with the CONDESCRIPTIVE and ONEWAY programs. As a further verification of the computations, cluster scores were printed for each subject using the WRITE CASES option.

RESULTS

Close examination of the composition of the four groups: Group I (non-church goers, no reported religious experiences), Group II (non-church goers, reported religious experiences), Group III (church goers, no reported religious experiences), and Group IV (church goers, reported religious experiences) indicated no contamination from gender, marital status, university year, or age. One-way analyses of variance indicated no significant differences in these variables for the four groups in either experiment. Denomination, defined as Roman Catholic vs other, was not a significant factor in Study I but approached statistical significance ($p < .10$) in Study II. Slightly more Roman Catholics were in Group III relative to the other groups.

The distributions of people who reported religious experiences in general or who reported religious experiences but did not attend church were similar in both experiments. Whereas 23 of the 108 (21%) subjects in Study I reported religious experiences, 9 out of 41 (22%) admitted them in Study II. Similarly, 8 of the 108 (7%) in Study I had experienced a religious experience but did not attend church regularly while only 3 of the 41 (7%) reported this pattern in Study II.

Chi-squared analyses for each of the 138 items and the composite of the two primary statements that generated the four groups indicated multiple significant values ($p \leq .05$) for both studies. Most of these were associated with specific questions of the temporal lobe clusters. One potentially important trend was noted for Study I only: Subjects who reported religious experiences also tended to have learned meditational techniques ($\chi^2 = 6.12$, $df = 3$, $p = .05$).

The primary measure of validity for the selection of the four groups, church behavior, was statistically significant. Calculated omega-squared estimates from one-way analysis of variance (ONEWAY) indicated that the groups accommodated 67% of this variance in this variable for Study I (Table 1) and 73% of the variance in this variable for Study II (Table 2). Clusters of statements that were intended to reflect basic religious dogma also differentiated the various groups, although the effect was not as large as the church-behavior clusters. In Study I, religious experients displayed significantly more agreement ($F = 5.98$, $df = 3/104$, $\Omega^2 = 14\%$) with the statements of the cluster than the non-experienced. *A posteriori* (Duncan; $p < .05$) tests indicated that the non-church goers, non-experienced agreed much less than any of the churchgoing or religious-experienced groups. In Study II, a clear "intensity of religious behavior-dependence" was noted with each group scoring higher on the dogma scale with progressive involvement in churchgoing and religious experience ($F = 9.22$, $df = 3/37$, $\Omega^2 = 27\%$).

Factor analyses (FACTOR) confirmed the separate sources of variances for the temporal-lobe-related clusters and mundane psychological and proprioceptive reports. In Study I, only two factors emerged that accommodated 63% of the variance. The first factor displayed an eigenvalue of 2.57 and explained 43% of the variance while the second factor displayed an eigenvalue of 1.17 and accommodated 20% of the variance. After Varimax rotation, the first factor was loaded (correlation coefficients in parentheses) by Temp I (0.70), Temp II (0.64), Temp III (0.69), and Temp IV (0.63) but not by mundane psychological (0.21) or proprioceptive (0.01) reports. They loaded the second factor with coefficients of 0.72 and 0.40, respectively, while the temporal lobe clusters were not significant statistically ($r \leq .20$).

When the temporal lobe clusters with the paranormal component removed plus this component were used in Study I, two factors also emerged (eigenvalue = 2.79; 40%; eigenvalue = 1.29; 19%) that accommodated 59% of the variance. After Varimax rotation Factor 1 was loaded by Temp A (0.59), Temp B (0.47), Temp C (0.63), Temp D (0.61), and the paranormal cluster (0.78) but not by the mundane psychological (0.18) or proprioceptive (−0.07) measures. They loaded on the second factor again (0.40 and 0.75, respectively). For Study II, two factors also emerged that accommodated 66% of

the variance. The first factor (eigenvalue = 3.43; 49% of the variance) was loaded by temporal lobe A (0.67), B (0.53), C (0.56), D (0.85), and the paranormal cluster (0.66) but not by the mundane psychological (0.07) or proprioceptive (0.23) reports. Again, they were loaded on the second factor (eigenvalue = 1.17, 17% of the variance) with coefficients of 0.79 and 0.56, respectively.

The means and standard deviations for the four main groups: Group I (non-church goers, no reported religious experiences; $n = 52$), Group II (non-church goers, religious experiences; $n = 8$), Group III (church goers, no reported religious experiences; $n = 33$), and Group IV (church goers, reported religious experiences; $n = 15$) from Study I are shown in Table 1. Omega-squared estimates for explained variance and *a posteriori* (Duncan's) comparisons are also shown. Two-way analyses of variance (ANOVA) according to church attendance and religious experiences indicated neither significant ($p > .05$) main effects nor interactions for the mundane psychological, proprioceptive or partial Lie scale clusters.

TABLE 1

MEANS ± STANDARD DEVIATIONS FOR SCORES ON VARIOUS CLUSTERS

Label	Group I	Group II	Group III	Group IV	Ω^a: %
n	52	8	33	15	
MPSYC	78±12	76±17	78±10	73±13	2
MPROP	56±17	60±20	53±14	51±17	2
Temp I	37±16[a]	53±16[b]	38±16[a]	37±14[a]	7
Temp II	32±14[a]	52±22[b]	34±15[a]	30±17[a]	11
Temp III	18±19[a]	36±20[b]	15±13[a]	11±18[a]	10
Temp IV	15±12[a]	32±25[b]	22±15[a]	18±15[a]	9
PARANO	32±15[a]	62±20[b]	38±19[b]	33±17[a]	18
PRES	27±21[a]	72±26[c]	40±20[b]	43±24[b]	25
TCP	37±19[a]	55±20[b]	36±22[a]	25±22[a]	9
Temp A	33±16[a]	51±19[b]	35±14[a]	36±14[a]	8
Temp B	34±14	46±17	33±15	30±16	6
Temp C	18±19[a]	36±20[b]	15±13[a]	11±18[a]	10
Temp D	15±16[a]	29±26[b]	26±20[a]	22±20[a]	9
Languaging	26±25[a]	46±30[b]	25±25[a]	47±32[b]	9
Dogma	38±21[a]	58±24[b]	52±15[b]	54±13[b]	14
Church Behavior	16±12[a]	46±18[b]	47±14[b]	69±15[c]	67
ODDYES	38±25[a]	30±32[a]	36±23[a]	17±18[b]	8
PLIE	79±13	79±20	77±16	79±19	<1

Note.—Scores for temporal-lobe signs, mundane psychological and proprioceptive experiences, languaging, church behavior and dogma, answers to odd statements (ODDYES), and a lie scale for groups in Study I according to no regular church attendance, no reported experience (Group I), religious experience, no church attendance (Group II), no religious experience but church attendance (Group III), and religious experience and church attendance (Group IV). Omega squared estimates of explained variance for the four groups are also given. Numbers of subjects (n) are given.
[a,b] $p < .05$. [b,c] $p < .05$.

People who reported religious experiences ($n = 23$) scored ($p < .05$, all $dfs = 1/104$) significantly higher on the paranormal ($F = 5.54$), Temp I ($F = 3.51$), Presence ($F = 14.77$), and languaging ($F = 10.10$) clusters than those who did not report religious experiences ($n = 85$). Subjects who reported church attendance at least once per month ($n = 48$) also scored significantly higher than non-church goers ($n = 60$) on Temp III ($F = 4.76$), Temp C ($F = 4.76$), and Temp D ($F = 4.43$) clusters. Religious experients displayed significantly ($F = 6.96$) fewer "true" responses to the odd sensations cluster compared to those who did not report the occurrence of religious experiences. One-way *a posteriori* tests (considering the discrepancy in numbers of subjects within the two subgroups) indicated that the effect was primarily due to the lower scores on those who reported experiences but also attended church regularly.

Most stable effects ($p < .05$, all $dfs = 1/104$) were the interactions between the two conditions for Temp I ($F = 5.22$), Temp II ($F = 10.41$), Temp III ($F = 6.78$), Temp IV ($F = 7.78$), paranormal ($F = 12.15$), Presence ($F = 15.43$), TCP (telepathy-clairvoyance-precogntion, $F = 7.89$), Temp A ($F = 4.93$), Temp B ($F = 4.11$), Temp C ($F = 6.75$), and Temp D ($F = 4.12$) clusters. *A posteriori* analyses indicated that all of these interactions were based primarily on the elevated scores of Group II compared to the other three groups.

Similar results were noted in Study II. The means and standard deviations for the clusters from the four groups are shown in Table 2. Two-way analyses of variance according to reported religious experiences and church attendance indicated no significant main effects or interactions for the mundane psychological, proprioceptive, Lie scale, languaging, TCP, or oddyes clusters. However, people who reported religious experiences ($n = 9$) scored significantly ($p < .05$, all $dfs = 1/37$) higher than those who did not report experiences ($n = 32$) on the Temp I ($F = 3.65$), Temp II ($F = 12.67$), Temp III ($F = 5.18$), Temp IV ($F = 10.83$), Presence ($F = 19.14$), Temp A ($F = 4.81$), Temp B ($F = 4.16$), Temp C ($F = 5.18$), and Temp D ($F = 11.83$), and paranormal clusters ($F = 10.73$).

People who attended church regularly ($n = 20$) also scored higher than non-church goers ($n = 21$) regardless of religious experience on Temp I ($F = 6.27$) and Temp A ($F = 4.81$). There was a significant interaction between religious experience and a church-attendance for Temp A ($F = 5.73$) and interactions that approached significance ($p = .10$) for languaging ($F = 3.65$) and Temp I ($F = 3.12$). The interactions were due primarily to the elevated scores for those who attended church but who did not have a religious experience compared to the other groups and to those who had a religious experience but did not attend church regularly compared to the other two groups.

TABLE 2
MEANS ± STANDARD DEVIATIONS FOR SCORES ON VARIOUS CLUSTERS

Label	Group I	Group II	Group III	Group IV	Ω^2: %
n	18	3	14	6	
MPSYC	71±13	80±00	71±11	76±16	4
MPROP	39±12	40±26	44±14	50±15	7
Temp I	19±12[a]	43±22[b]	35±16[b]	38±12[b]	29
Temp II	17±11[a]	41±17[b]	20±11[a]	33±15[b]	29
Temp III	8±12	28±27	5±10	14±18	15
Temp IV	8±11[a]	29±23[b]	12±12	26±13[b]	25
PARANO	21±20[a]	56±29[b]	28±14[a]	43±17[b]	25
PRES	19±27[a]	83±29[b]	26±15	54±29[c]	39
TCP	22±19	33±42	29±20	33±16	5
Temp A	16±11[a]	42±22[b]	30±13[b]	32±11[b]	33
Temp B	19±11[a]	30±17	24±14	33±12[b]	15
Temp C	8±12	28±27	5±10	14±18	15
Temp D	6±12[a]	27±19[b]	15±16	33±15[b]	15
Languaging	17±26	44±19	40±35	22±34	33
Dogma	38±18[a]	41±24[a]	54±15[b]	69±13[b]	27
Church Behavior	14±10[a]	48±27[b]	44±11[b]	72±15[c]	73
ODDYES	17±17	26±11	24±18	33±27	5
PLIE	69±15	81±23	76±11	76±13	8

Note.—Scores are for temporal-lobe signs, mundane psychological and proprioceptive experiences, languaging, church behavior and dogma, answers to odd statements (ODDYES), and a lie scale for groups in Study II according to no regular church attendance, no reported experience (Group I), religious experience, no church attendance (Group II), no religious experience but church attendance (Group III), and religious experience and church attendance (Group IV). Omega squared estimates of explained variance for the four groups are also given. Numbers of subjects (*n*) are given.
[a,b]$p < .05$. [b,c]$p < .05$.

Since the people who reported religious experiences, regardless of church attendance ($n = 23$) were more likely to have learned meditation (Study I), one-way analyses of variance were completed for all clusters according to whether or not the person had reported yes or no on the "I have learned to meditate" statement. The 10 meditators scored significantly ($p < .05$, all dfs $= 1/21$) higher on the Temp I ($F = 4.30$) and Paranormal ($F = 6.95$) clusters than the 13 non-meditators. There were no other statistically significant differences. Considering the size and eccentricity of Group II, further analyses were completed on the basis of meditation history. The four subjects from Group II who had learned to meditate scored significantly ($F = 5.46$, $df = 1/11$, $p < .05$) higher ($M = 43\pm26$) compared to non-meditators ($M = 11\pm22$) on the oddyes and "presence" clusters ($M = 79\pm18$ and $M = 50\pm25$, respectively; $F = 5.48$, $df = 1/11$, $p < .05$). However, there were no statistically significant differences between the two groups on any of the temporal-lobe clusters; the differences did not even approach significance ($p > .30$).

Discussion

The present study supports several logical extrapolations of the hypothesis that religious experiences are normal consequences of temporal-lobe function. People who reported to have had religious experiences were more likely to display "true" responses to statement clusters indicative of temporal-lobe signs compared to those people who did not report such experiences. The patterns were evident in both studies, but most obvious in Study II. In Study I, only the group that had reported religious experiences but did not attend church regularly accounted for most of the variance on the temporal-lobe clusters. The difference between studies could be explained if subjects who had experiences and attended church in Study I did not admit their display, i.e., if Group I contained subjects who should have been classified in the other groups. In fact, the non-church-goer, non-experienced group in Study I tended to score much higher than Group I in Study II.

Certainly one of the most intriguing results of the present study was the significant contribution from statements frequently labelled as paranormal experiences (Persinger, 1974a). This cluster was a major source of the statistical significance associated with temporal-lobe signs. Within this subcluster, the four statements involved with the experience of a "presence" were particularly dominating. The relationship between mystical-religious, paranormal experiences and frank temporal-lobe symptomatology, such as the feeling of "presence," is not unique to this study. Neppe (1983) has reported very similar patterns (using a different inventory) among populations with spontaneous paranormal experience.

The shared variance between temporal-lobe, paranormal, religious, and "presence" reports was also indicated within both studies on the basis of the factor analyses. These observations are consistent with the "conceptual core" hypothesis (Persinger, 1976). It states that verbal behavior concerning unusual events, unexpected or unknown phenomena, parapsychological experiences, death-related references, God-beliefs, and popular irrational contentions (e.g., astrology) tend to occur within the same verbal stream. Once a reference to one of these events occurs, statements concerning each of the other forms follows within a few minutes. The discussion is invariably punctuated by a personal proof, usually a paranormal experience involving a death or crisis episode.

Several internal consistencies support the reliability of these results. First, the four basic groups selected by the two statements accommodated a significant amount of the variance in the church-behavior and dogma clusters. People who had reported religious experiences as well as church attenders (without reported experiences) were significantly higher than non-experienced or non-church attenders. Secondly, the proportions of the numbers of people who

reported religious experiences were similar in both studies. Whereas 21% of the population in Study I reported religious experiences 22% reported them in Study II. Although only a small number of subjects composed the unusual group who scored highest on the temporal-lobe scales, these subjects composed a consistent 7% of the population in both stuides.

There were discrepancies that must be addressed. First, the groups who attended church regularly and did not report a religious experience also scored higher on some clusters than the non-experienced, non-church goers. Certainly there is a possibility that they had had these experiences but simply did not report them. The "profound private nature" of religious experiences limit their report,[3] even in the most professional settings (Bear & Fedio, 1977). In addition, people who attended church regularly tended to score significantly higher on the cluster usually reserved for "psychotic" populations. This is not surprising in light of the type of statements that composed this cluster, such as "I have had a vision of Christ" and "I am a special agent of God"; they are compatible with dogma. It is also reiterates the importance of where temporal-lobe behaviors are displayed, i.e., within an academic, religious, or hospital-test setting, with respect to the type of diagnosis that follows.

There is a possibility that subjects who reported religious experiences have learned to label private behaviors differently or more succinctly than those who did not report these experiences. Since more of these subjects in Study I but not Study II had learned to meditate compared to the other groups, such alterations in the report of or perception of private behaviors might be expected. Meditational history, however, did not enhance the report of temporal-lobe signs although it may have influenced the report of odd symptoms. Even were it a confounding factor, it would still be specific to temporal-lobe signs since the groups who reported religious experiences did not differ from comparison groups with respect to normal (mundane) psychological or proprioceptive statements.

Of course, the ultimate limitations of this study rest with the self-report method and the lack of immediate correlative clinical neurological data and direct temporal-lobe measurements. There are superficial similarities between the statements that comprised the clusters and the classic symptoms of partial complex epilepsy (Neppe, 1983). No doubt the conclusions of this study hinge upon the validity of the particular labels that comprise the private behaviors and the actual neurological basis from which they are derived. This limitation is acknowledged. Perhaps the application of non-invasive techniques for the measurement of deep brain activity, such as local cerebral blood flow and positron emission tomography, during conditions likely to generate religious or God-related experiences would be a more appropriate methodology for the verification or refutation of the hypothesis.

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